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Anxiety in university students: analysis of psychological measurement instruments. A systematic review

Ansiedad en universitarios: análisis de los instrumentos psicológicos de medición. Una revisión sistemática

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Abstract

The objective of this study was to synthesize recent evidence (2020–2025) on the validity, reliability, factor structure, and invariance of brief instruments for measuring anxiety in the university population and to propose a minimum battery for screening and follow-up. A critical review was conducted with searches in Scopus, SciELO, and Google Scholar, peer screening and extraction, and full-text reading. Psychometric parameters (α/ω, AFC, multigroup invariance, AUC) and usage data in Latin America and Ecuador were collected. The GAD-7, abbreviated STAI, DASS-21, BAI, and OASIS were analyzed, along with complementary situational and transdiagnostic scales (e.g., FCV-19S, ESTAD). The findings converge on a robust unidimensional structure of the GAD-7, with high internal consistency (α/ω ≥ .80) and invariance by sex and age; the abbreviated STAI shows adequate reliability, maintaining the state/trait distinction; the DASS-21 retains its three-factor model and allows scores to be equated with the GAD-7; the BAI, despite its somatic bias, maintains acceptable reliability; and the OASIS provides a parsimonious estimate of severity and dysfunction. It is concluded that a staggered battery of GAD-7 + OASIS—or DASS-21 with conversion to GAD-7 for time series—optimizes the economy of application, accuracy, and cross-cultural comparability in university contexts.

Keywords: college students, psychometrics, mental health.

Resumen

Este trabajo tuvo como objetivo sintetizar la evidencia reciente (2020–2025) sobre la validez, fiabilidad, estructura factorial e invarianza de instrumentos breves para medir ansiedad en población universitaria y proponer una batería mínima para tamizaje y seguimiento. Se realizó una revisión crítica de alcance con búsqueda en Scopus, SciELO y Google Scholar, cribado y extracción por pares, y lectura a texto completo. Se recopilaron parámetros psicométricos (α/ω, AFC, invarianza multigrupo, AUC) y datos de uso en Latinoamérica y en Ecuador. Se analizaron el GAD-7, el STAI abreviado, la DASS-21, el BAI y el OASIS, y, de forma complementaria, escalas situacionales y transdiagnósticas (p. ej., FCV-19S, ESTAD). Los hallazgos convergen en una estructura unidimensional robusta del GAD-7, con alta consistencia interna (α/ω ≥ .80) e invarianza por sexo y edad; el STAI abreviado muestra fiabilidad adecuada, manteniendo la distinción estado/rasgo; la DASS-21 conserva su modelo trifactorial y permite equiparar puntajes con el GAD-7; el BAI, pese a su sesgo somático, mantiene fiabilidad aceptable; y el OASIS aporta una estimación parsimoniosa de gravedad y disfunción. Se concluye que una batería escalonada GAD-7 + OASIS —o DASS-21 con conversión a GAD-7 para series temporales— optimiza la economía de aplicación, la precisión y la comparabilidad intercultural en contextos universitarios.

Palabras clave: estudiantes universitarios, psicometría, salud mental.

Introduction

Anxiety within the university context represents not only a health issue but also a significant challenge affecting academic performance. Emotional, cognitive, and somatic symptoms are associated with a heightened risk of dropout and unsatisfactory student outcomes (do Nascimento et al., 2020).

In recent years, research in this area has progressed from merely estimating the internal consistency of assessment instruments to analyzing their factorial structure and demonstrating measurement invariance. This process is particularly relevant in Latin America and among university samples in Ecuador (Hayes & Coutts, 2020).

Within this framework, some brief instruments achieve an appropriate balance between efficiency and precision. The GAD-7 (Generalized Anxiety Disorder-7) exhibits a unidimensional structure and high reliability, along with evidence of invariance by sex and country in Latin America, as well as specific data on Ecuadorian university students. Therefore, its use is recommended as a frontline screening tool and for institutional monitoring purposes (Moreno-Montero et al., 2024; Villarreal-Zegarra et al., 2024).

The STAI (State-Trait Anxiety Inventory) maintains the distinction between state and trait anxiety, providing evidence of invariance by sex and age. Consequently, it effectively captures changes in state anxiety linked to evaluative situations without overwhelming students, justifying its recommendation in academic contexts (Valente et al., 2025). Additionally, the stability of the three-factor model of the DASS-21 (Depression Anxiety Stress Scales-21) and the availability of equipercentile conversion tables with the GAD-7 and PHQ-8 underscore its practical advantage for maintaining comparable time series when transitioning between instruments.

Beyond symptom quantification, it is essential to consider functional interference. The Spanish version of the Overall Anxiety Severity and Impairment Scale (OASIS) provides a brief measure of severity and impairment, validated with Spanish-speaking university populations in both face-to-face and online formats. This instrument assesses the subjective magnitude of anxiety and the extent to which symptoms interfere with academic performance, social functioning, daily life, and work, thus serving as a valuable indicator for referral and prioritization decisions. Its five-item structure and simple response format facilitate implementation in broad screenings and follow-ups, requiring less than a minute per application and minimal scoring time. In the case of the DASS-21, retaining the three-factor model while providing equipercentile links with the GAD-7 and PHQ-8 aids in integrating historical datasets established with different instruments and estimating longitudinal trends under a common framework (Abdin et al., 2025). The combination of a functional severity indicator like the OASIS with a broad affective profile contributes to a tiered battery that balances application efficiency and psychometric robustness, promoting care prioritization in universities with high demands and limited resources.

Regarding contextual impact, the proposed brief measures also offer advantages. The BAI (Beck Anxiety Inventory), although centered on somatic symptoms, demonstrates adequate reliability and has a long-standing history of clinical and non-clinical use, contributing additional insights into the physical manifestations of anxiety among young individuals (Creamer et al., 1995; Oh et al., 2018). Similarly, situational scales like the FCV-19S, designed to measure specific fear related to COVID-19, and transdiagnostic scales such as the ESTAD, which evaluates anxiety and depression among students, underscore the need for contextualized tools that are sensitive to prevalent mental health issues (Martínez-Lorca et al., 2020; Valle-Palomino et al., 2024).

The objective of this study is to synthesize the published evidence from 2020 to 2025 concerning the psychometric properties—internal structure, reliability, invariance, and potential score links—of brief instruments for assessing anxiety among university populations, with an emphasis on Latin America and specifically Ecuador. Based on this synthesis, the aim is to establish empirical criteria that will support the discussion of results and underpin a proposal for a minimal tiered battery designed for the screening and monitoring of university anxiety. Given the review nature of this work, no specific hypotheses are proposed.

Methodology

Study design

A scoping review with narrative synthesis was conducted to map and critically evaluate recent evidence regarding the psychometric properties of brief instruments for assessing anxiety in university populations. This design facilitated the identification of available instruments, their metric strengths, and gaps in research within Latin American contexts.

The search included empirical articles published between January 2020 and March 2025 in peer-reviewed journals in Spanish or English, which evaluated university students and reported, at a minimum, analyses of factorial structure and reliability. Studies contributing evidence on measurement invariance and/or metric relationships between scales were also included.

Information sources and search strategy

Systematic searches were conducted in Scopus, SciELO, and Google Scholar, combining descriptors related to:

- **Anxiety:** anxiety, generalized anxiety, fear**;**
- **Population:** university students, college students**;**
- **Psychometric properties:** validity, reliability, factor analysis, measurement invariance**;**

- **Instruments of interest:** GAD-7, STAI, DASS-21, BAI (Beck Anxiety Inventory), OASIS, FCV-19S (COVID-19 Fear Scale), and ESTAD (Anxiety and Depression Symptoms Scale).

The search was supplemented by a manual review of the references of key articles identified during the initial phase.

Inclusion and exclusion criteria

Included studies met the following criteria:

- evaluated at least one of the selected instruments in samples of university students;
- reported internal consistency indices (α and/or ω), confirmatory factor analysis, and/or evidence of invariance among groups;
- provided access to the full text.

Exclusions were made for:

- studies focused exclusively on clinical populations;
- research lacking basic psychometric indicators;
- unpublished theses;
- gray literature and documents not peer-reviewed.

Data extraction procedure

Study selection was performed in two stages:

- screening of titles and abstracts, and
- full-text reading.

Discrepancies were resolved by consensus among reviewers.

For each eligible article, the following variables were extracted:

- country and context of the study,
- sample size and characteristics,
- version and type of instrument,
- tested factorial model,
- fit indices,
- reliability coefficients (α and/or ω),
- invariance results (by sex, age, or country),
- information on metric links, cut-off scores, or ROC curves (when available).

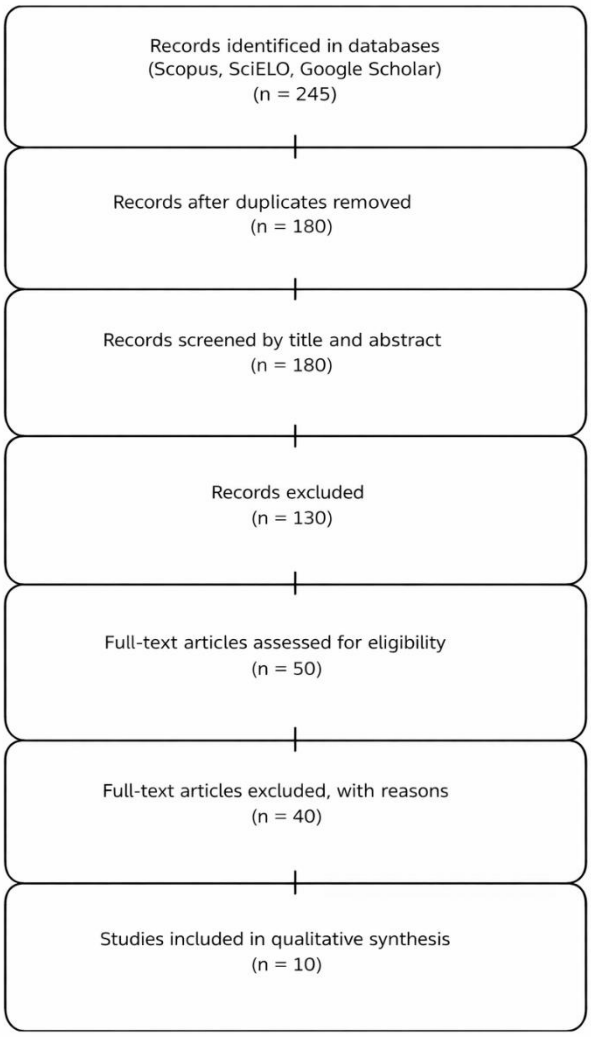
Study selection process

The identification and selection process adhered to PRISMA 2020 recommendations for scoping reviews.

- A total of 245 records were identified: Scopus (120), SciELO (45), and Google Scholar (80).
- Following the removal of 65 duplicates, 180 records remained for screening.
- At this phase, 130 articles were excluded for not focusing on university populations or for lacking sufficient information on psychometric properties (factorial structure, reliability, or invariance).
- Fifty articles were assessed in full text.
- Forty studies were excluded for not utilizing brief instruments, failing to report factorial/invariance analyses, or concentrating on clinical populations.

In the end, ten studies met the criteria and were included in the qualitative synthesis.

Figure 1 presents the PRISMA flow diagram.



PRISMA flow diagram corresponding to the process of identifying, screening, assessing eligibility, and including studies on brief anxiety instruments for university populations (2020–2025).

Table 1

Summary of brief anxiety instruments for university populations (2020–2025)

Instrument	Items	Dimensionality	Evidence ω (≥ .85)	Invariance (sex/age/country)	Primary Purpose	Time (min)	Digital Usability	Strengths	Precautions	Robustness Score (0–3)	Brevity Score (0–3)	Versatility Score (0–4)	Overall Score (0–10)

ESTAD	DASS-21 (Anxiety)	STAI-S-8 / STAI-T-8	OASIS	GAD-7
21	7	8	5	7
Transdiagnostic (anxiety/depression)	Three-factor (D-A-E)	State and Trait (shortened)	Unidimensional	Unidimensional
Yes	Yes	Yes	Yes (adequate)	Yes
Under evaluation (favorable data)	Yes (recent reports)	Yes (sex/age)	Favorable data	Yes (sex/age)
Broad transdiagnostic screening	Broad affective profile; monitoring	State/trait anxiety; situational peaks	Severity + functional impairment	General anxiety screening
6	6	3	2	3
High	High	High	High	High
Global map of core symptoms.	Equipercentile link with GAD-7; population	Sensitivity to situational	Measures functional interference; very brief.	Brief; psychometric robustness; intercultural
Less specific for pure anxiety.	Emphasis on hyperarousal; longer	Not a primary population	Does not profile specific domains of anxiety.	Does not quantify functional impairment
3	3	3	3	3
1.29	1.29	2.57	3.00	2.57
2.80	3.00	2.40	2.60	3.20
7.09	7.29	7.97	8.60	8.77

FCV-19S	7	Unidimensional	Yes	Favorable reports	Situational fear (COVID-19)	3	High	Rapid response to mass stressors.	Decreasing relevance outside of context.	3	2.57	1.40	6.97
BAI	21	Dominant unidimensional	Yes	Yes (transcultural)	Somatic profile of anxiety.	9	Medium	Details somatic symptoms.	May inflate scores in medical contexts.	3	0.00	1.80	4.80

Note. Author's own elaboration based on the studies included in the review.

Table 2

Characteristics of the studies included in the review on brief anxiety instruments for university populations (2020–2025)

No.	Authors (Year)	Study Objective	Methodology	Main Findings
1	Moreno-Montero et al. (2024)	Establish the psychometric properties of the GAD-7 in Ecuadorian university students.	Instrumental study, cross-sectional design. Sample of university students from three universities in Ecuador. Confirmatory factor analysis, reliability estimation, and item response modeling applied.	Confirmed unidimensional structure, high internal consistency (α/ω ≥ .90), good convergent validity with pathological worry, and measurement invariance by sex, supporting the use of GAD-7 in Ecuadorian university contexts.
2	Osma et al. (2022)	Adapt and validate the anxiety and depression severity and impairment scales (OASIS/ODSIS) in university populations.	Instrumental study with Spanish university students. Cross-sectional design. Confirmatory factorial analyses, reliability estimations (α, ω), and convergent validity with other emotional distress measures performed.	Scales demonstrated adequate unidimensional structure, high internal consistency, convergent validity with measures of anxiety and depression, and the ability to discriminate levels of severity and functional interference among the university population.
3	Valle-Palomino et al. (2024)	Analyze the psychometric properties and sociodemographic profile of the ESTAD scale in Peruvian university students.	Instrumental and descriptive study with university students. Confirmatory factor analyses, item analyses, and internal consistency estimations by subscale employed.	Confirmed structure of multiple subscales with good overall fit indices for TAS and TDS scales, adequate reliability, and expected associations with emotional distress indicators, supporting its transdiagnostic use for anxiety and depression in universities.

4	Martínez-Lorca et al. (2020)	Convert and validate the Fear of COVID-19 Scale (FCV-19S) among Hispanic university students.	A cross-sectional study with university students in Spain was conducted. Confirmatory factor analyses, reliability tests, and evaluations of convergent validity related to state anxiety measures and other emotional symptoms were applied.	FCV-19S exhibited good internal consistency (α ≈ .86), and the unidimensional model showed a good fit. The scales positively correlated with state anxiety and emotional symptoms, validating their utility for measuring irrational fear related to COVID-19 in a university context.
5	Abdin et al. (2025)	Evaluate the validity, reliability, measurement invariance, and equipercentile link of the DASS-21 compared to the PHQ-8 and GAD-7 in youth. Conducted as an instrumental study with young individuals in Singapore using a cross-sectional design.	Confirmatory factor analyses, multigroup invariance tests, and equipercentile equating techniques with PHQ-8 and GAD-7.	Evidence of practical equivalence of scores between the DASS-21 and PHQ-8 and GAD-7 obtained, allowing for their transformation without compromising comparability across different measurement periods.
6	Valente et al. (2025)	Examine the validity, reliability, and invariance by sex and age of the abbreviated versions of the STAI-Y among young Italian adults.	Instrumental study with young Italian adults; cross-sectional design.	Confirmatory factorial analyses, reliability estimations, and invariance tests conducted by sex and age groups. Overall, the abbreviated versions of the STAI-Y showed good internal consistency, adequate factorial structure, and invariance by sex and age, supporting their use as brief alternatives to the STAI scale for academic-contextual anxiety assessment.
7	do Nascimento et al. (2020)	Identify factors associated with anxiety and depression among university students through the application of an anxiety and depression scale.	Quantitative, cross-sectional observational study among Brazilian university students. Method: sociodemographic questionnaire and Hospital Anxiety and Depression Scale adapted to the educational context.	Conclusions indicated that women and certain fields were more likely to experience anxiety and depression. The HADS demonstrated good performance in discriminating the probable presence of anxiety and depression, highlighting academic and sociodemographic factors influential in the emotional distress of university students.

Note. Author's own elaboration based on the studies included in the review.

Figure 2

Overall score (0–10) of the brief anxiety instruments included in the review

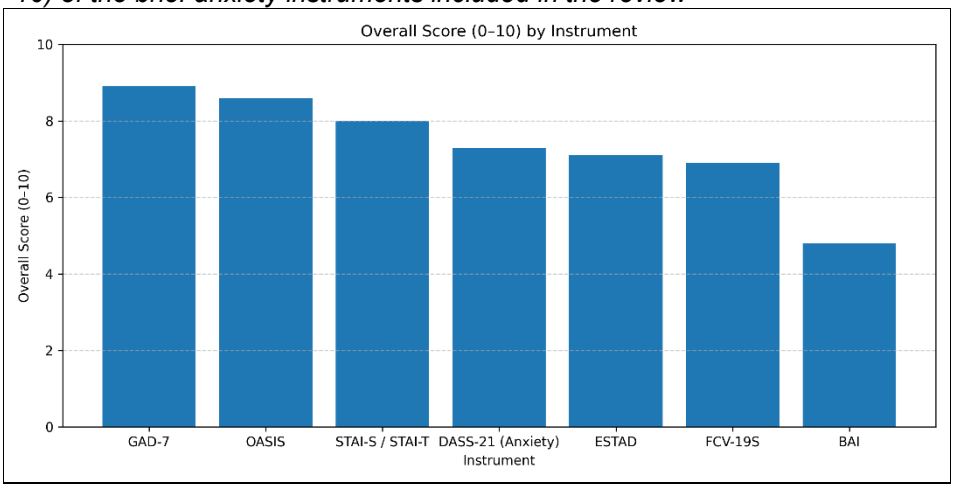


Figure 3

Estimated administration time (in minutes) of the brief anxiety instruments included in the review

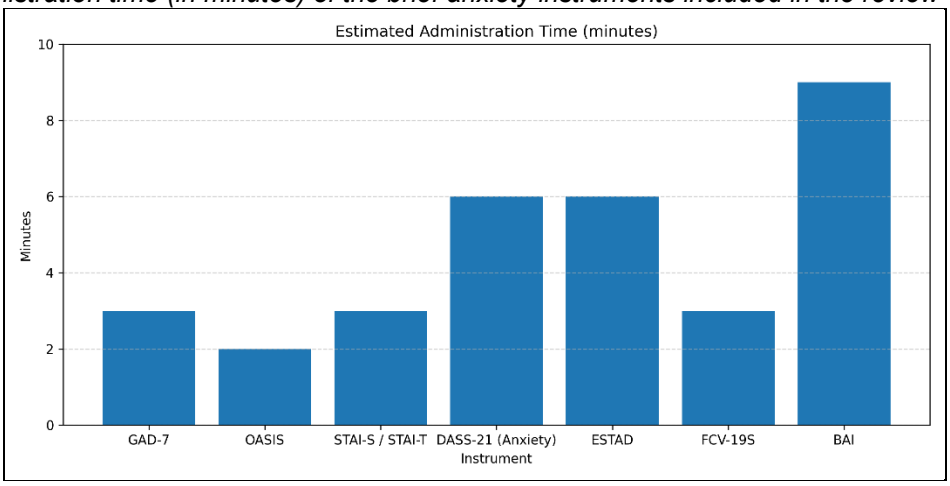
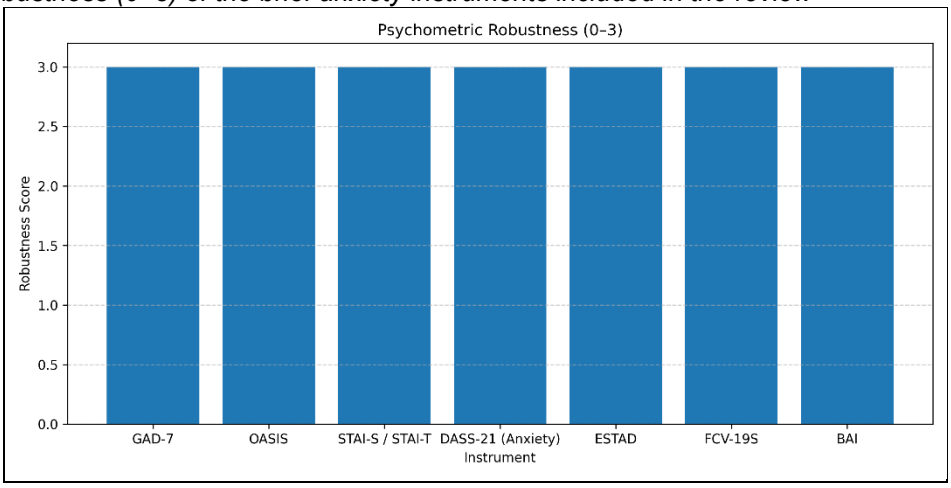


Figure 4

Psychometric robustness (0–3) of the brief anxiety instruments included in the review



Results

The analyses converge on the conclusion that, for the period from 2020 to 2025, the GAD-7 offers the best balance between brevity and psychometric performance for university populations. This instrument maintains a stable unidimensional structure, high internal consistency (ω ≥ .80), and invariance across at least sex and age, with evidence gathered from Latin America and Ecuadorian university samples. Therefore, it is well-suited as a frontline screening tool and for institutional monitoring (Moreno-Montero et al., 2024; Villarreal-Zegarra et al., 2024). Its primary limitation is that it does not assess functional impairment. Consequently, when prioritizing cases or documenting impact on academic performance and daily life, the OASIS serves as a complementary alternative. With only five items, it incorporates severity and interference, is validated for Spanish-speaking university students, and adapts well to online applications, facilitating its integration into counseling platforms (Osma et al., 2022).

The abbreviated STAI (STAI-S-8/STAI-T-8) retains the distinction between state and trait anxiety and demonstrates invariance by sex and age among young adults. As such, it is particularly useful for recording situational fluctuations—such as during exam weeks—and for monitoring short-term changes without overburdening participants (Valente et al., 2025).

Meanwhile, the DASS-21 consistently maintains a three-factor model (depression, anxiety, and stress) and shows evidence of equipercentile links with the GAD-7 and PHQ-8. This capability allows for the conduction of comparable time series, even if the instruments vary across cohorts or semesters. In contrast, the BAI emphasizes somatic symptoms (e.g., palpitations, shortness of breath), which may inflate scores in contexts of medical comorbidity; therefore, it is recommended to triangulate its results with less somatic scales and indicators of functional impairment.

Situational instruments, such as the FCV-19S, adequately evaluate contextual fear associated with the pandemic without pathologizing adaptive responses. Additionally, transdiagnostic estimators like the ESTAD have shown utility for simultaneous screening of anxiety and depression in low- and middle-income contexts, where healthcare demands are high.

In summary, the findings suggest a tiered evaluation strategy for university populations:

1. **General screening:** Use GAD-7 as the primary option**.**
2. **Assessment of functional interference or when prioritizing cases:** Add OASIS**.**
3. **Situational stress or brief monitoring:** Utilize STAI-S-8**.**
4. **Longitudinal tracking or need for comparability with other instruments:** Use the anxiety subscale of the DASS-21, leveraging its equipercentile link with GAD-7**.**
5. **Somatic focus:** BAI can be employed to assess physiological symptoms, always accompanied by additional measures**.**
6. **Specific contexts or situational crises:** Consider FCV-19S or ESTAD depending on the nature of the evaluated issue.

Ultimately, the findings support that there is no "best test" in the abstract; rather, the optimal choice depends on the evaluative purpose and the available evidence within Latin American university contexts. There remains a need to strengthen comparisons between instruments using robust indices such as ω and appropriate invariance tests (Hayes & Coutts, 2020).

Discussion

Overall, the findings from this review emphasize that there is no universal "best" test; rather, the effectiveness lies in appropriate combinations of instruments tailored to specific purposes and contexts. The most consistent evidence supports the GAD-7 as the initial filter in the evaluation sequence: its stable unidimensional structure, high internal consistency—especially when estimated by ω—and demonstrated invariance across sex and age render it an ideal tool for population monitoring and cohort tracking in university mental health programs (Villarreal-Zegarra et al., 2024; Moreno-Montero et al., 2024). However, the exclusive quantification of symptoms is insufficient when clinical prioritization or academic adjustments are required. In this regard, the OASIS contributes a clear metric of severity and functional interference in just five items, facilitating referral criteria and enhancing the efficient management of university counseling resources (Osma et al., 2022).

Regarding other instruments, the abbreviated STAI maintains the distinction between state and trait anxiety and continues to be useful for detecting situational peaks of anxiety—such as during exam periods—without imposing excessive burden on students. The DASS-21 retains its value in broader monitoring processes, and with recently developed equipercentile links, it offers interoperability with the GAD-7, facilitating temporal comparisons even when instruments vary across semesters or cohorts. The BAI remains useful for characterizing

the somatic expression of anxiety; however, its high sensitivity to physical symptoms requires careful interpretation in contexts of medical comorbidity or high bodily salience. In such cases, triangulating its results with less somatic measures and indicators of functional impairment is recommended (Creamer et al., 1995; Oh et al., 2018; do Nascimento et al., 2020).

The post-pandemic experience has revealed that some manifestations of anxiety are distinctly situational. The FCV-19S has proven to be a specific marker for the fear associated with COVID-19 without pathologizing adaptive responses to intense collective stressors, establishing itself as a useful reference in health crisis scenarios (Martínez-Lorca et al., 2020). From a transdiagnostic perspective, the ESTAD has shown adequate levels of fit and invariance in Peruvian university students (Valle-Palomino et al., 2024), enabling the mapping of anxiety and depression symptoms in high-demand healthcare contexts that require widely applicable screening tools to prioritize clinical needs.

From a psychometric perspective, recent developments indicate that ω has replaced Cronbach's alpha as the preferred estimator of reliability, especially in models with heterogeneous loadings, and underscore the importance of demonstrating measurement invariance before making comparisons across populations. This emphasis not only represents a conceptual advancement but also an ethical requirement to ensure fair and comparable assessments.

In practical terms, the findings support a tiered assessment model that includes: (a) universal screening using the GAD-7; (b) application of the OASIS when estimating functional interference or prioritization is needed; (c) the STAI-S-8 during periods of high demand or situational stress; and (d) integration of the DASS-21 in programs that require longitudinal continuity, with the possibility of equipercentile conversion to the GAD-7 to maintain comparable time series. This model can be implemented with lightweight institutional digital systems, based on percentile reporting and predefined decision rules.

However, relevant limitations remain: the absence of quantitative meta-analyses on effect sizes, the scarcity of studies in indigenous languages, and the lack of specific norms for student subpopulations within Latin America. In conclusion, the available evidence supports the use of brief instruments in contexts of mass stressors and the adoption of tiered assessment models that are robust, ethical, comparable, and suitable for university systems facing high demand.

Future research should delve into linguistic invariance, calibration using item response theory, and the development of local norms for Ecuadorian and Latin American universities to ensure that anxiety assessments contribute more accurately and equitably to mental health decision-making and educational processes.

Conclusions

The systematic data compilation conducted in this review illustrates that anxiety assessment among university students should be oriented towards a contextualized purpose rather than the pursuit of a single universal instrument. Recent evidence (2020–2025) positions the GAD-7 as the central reference point for screening and population monitoring, provided it is complemented by measures of functional interference, such as the OASIS, which enable the establishment of priorities and tracking of associated deterioration.

Complementarily, the strategic integration of the abbreviated STAI, the anxiety subscale of the DASS-21, and specific instruments like the BAI, FCV-19S, and ESTAD, facilitates the construction of tiered batteries that combine brevity, psychometric robustness, and clinical utility. This evaluation framework, grounded in contemporary approaches concerning factorial structure, internal consistency, convergent validity, and measurement invariance, not only enhances the technical quality of the data but also promotes ethical commitment to evaluative equity among subgroups.

The incorporation of local norms and the development of systems based on item response models represent necessary next steps to increase the sensitivity and accuracy of screening systems in Latin American university environments. Collectively, a minimal battery focused on the GAD-7 and OASIS, enhanced by the STAI-S-8 and DASS-21 when circumstances necessitate, constitutes a technically viable and operationally efficient option to support institutional early detection programs for distress and foster less distressful academic trajectories.

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